



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,409	12/15/2003	Don Pettibone	5589-04801 P1047	3959
35617	7590	01/24/2006	EXAMINER	
DAFFER MCDANEIL LLP			DETSCHER, MARISSA	
P.O. BOX 684908			ART UNIT	
AUSTIN, TX 78768			PAPER NUMBER	
			2877	

DATE MAILED: 01/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/736,409

Applicant(s)

PETTIBONE ET AL.

Examiner

Marissa J. Detschel

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-21 is/are allowed.
- 6) ☒ Claim(s) 1,2,4-8, and 12-14 is/are rejected.
- 7) ☒ Claim(s) 3 and 9-11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/14/04, 4/28/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statements filed on April 14, 2004 and April 28, 2004 have been fully considered by the examiner.

Drawings

Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4-7, and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claims 4-7, these claims disclose simulating methods involving altering of p- and s-polarized light characteristics, but it is uncertain as to how these are altered.

As to claim 12, the claim discloses the limitation of "illuminating the reticle with light having polarization characteristics substantially equivalent to polarization characteristics of light projected onto the reticle by the exposure system." The light that illuminates the reticle and the light projected onto the reticle by the exposure system are the same light. It is uncertain as to how these two light beams are different.

Claim 13, which is dependent from claim 12, inherit the problems of these claims, and are therefore also rejected under 35 U.S.C. 112, second paragraph.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato (USPN 6,665,052).

In regards to claim 1, Sato discloses a reticle inspection system comprising an optical subsystem (1-9, 100, 51) configured to produce an aerial image of a reticle (9) by simulating dose as a function of position that would be projected into a resist by an exposure system such that an aerial image is substantially equivalent to an image of the reticle that would be projected into the resist (11) by the exposure system. (column 1, lines 12-39)

The equivalency between the aerial image and the image of the reticle that would be projected into the resist provided on the wafer in Sato's device occurs due to the

uniform numerical aperture of the illumination optical system upon the surface to be illuminated. Due to this uniform numerical aperture throughout the system, the aerial image of the reticle and the image of the reticle that would be projected into the resist of the wafer undergo the same numerical aperture, illustrating an equivalency between the two images. This uniform numerical aperture also allows for an equivalency between the illumination of the two images.

Regarding claim 2, the simulation of Sato's device comprises altering the image to correct for differences between a numerical aperture at which the exposure system projects the image into the resist and a numerical aperture at which the optical subsystem produces the image. (column 6, line 34 to column 7, line 9 and column 8, lines 25-35)

A correction of the illuminance non-uniformness due to the insufficient satisfaction of the sine condition by a fly's eye lens used in the optical system is achieved by Sato's device through an optical filter (column 6, lines 44-63). If the fly's eye lens satisfies the sine condition, then a uniform numerical aperture will be provided in the optical system (column 1, lines 27-31). In order to solve the problem of a decrease of illumination in Sato's system, the sine condition of the fly's eye lens must be satisfied (column 8, lines 31-35). Therefore, if the sine condition is satisfied, there is a uniform numerical aperture throughout the optical system, resulting in a uniform luminescence, creating an equivalence between the numerical aperture at which the exposure system projects the image into the resist and a numerical aperture at which the optical subsystem produces the image.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (USPN 6,665,052). Sato discloses the placement of an optical filter (51) in an image plane of the optical subsystem. Sato does not disclose that the transmission characteristics of the optical filter, at an operating wavelength of the exposure system, are selected to substantially match filter characteristics of the resist, at the operating wavelength. It would be inherent that the transmission characteristics of Sato's filter match the filter characteristics of the resist in order to have full exposure of the resist occur with the aerial image take with the filter. If the characteristics don't match at the operating wavelength, then the exposure of the resist would be incomplete.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato as applied to claim 1 above, in view of Kenan et al. (USPN 6,268,093).

Sato does not disclose the use of a processor configured to detect defects on the reticle by analyzing the aerial image, wherein a substantial portion of the defects comprises defects that would be printed on the system.

Kenan discloses a method for a reticle inspection system that uses aerial imaging to detect defects that would print during the microlithographic process. Kenan discloses a system that matches the conditions (i.e. wavelength, numerical aperture) of

an optical exposure system and creates aerial images. The system creates these aerial images by using a simulated exposure system used to expose a photoresist during semiconductor fabrication. (column 3, lines 1-14)

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the system of Kenan to detect defects that would print during processing from an aerial image to a resist in Sato's device in order to create more accurate products (i.e. semiconductor chips) in a more economical way. By using the system of Kenan, one is able to set the limitations of the simulated exposure system desired, and an aerial image is formed that can be used to detect defects in the mask. By detecting these defects, it can be determined if the mask is a desirable mask for photolithographic processing of semiconductors.

Allowable Subject Matter

Claims 15-21 are allowed over the prior art.

Claims 3, 9, 10-13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claims 3 and 19, the prior art of record, taken alone or in combination, fails to disclose or render obvious an optical subsystem that forms an intermediate aerial image with a numerical aperture approximately equal to a numerical aperture at which the exposure system projects the image into the resist and projecting the intermediate aerial image into a detector, along with the rest of the limitations of claims 3 and 19.

As to claim 9, the prior art of record, taken alone or in combination, fails to disclose or render obvious an optical subsystem comprising a spatial filter of two equivalent objective lenses and an optical filter disposed at a focal point between the two lenses, along with the rest of the limitations of claim 9.

As to claim 10, the prior art of record, taken alone or in combination, fails to disclose or render obvious an optical subsystem comprising a spatial filter of two equivalent objective lenses and an optical filter disposed at a back focal plane of the first lens, along with the rest of the limitations of claim 9.

As to claim 11, the prior art of record, taken alone or in combination, fails to disclose or render obvious an optical subsystem comprising a filter configured to alter the polarization characteristics of the light in the aerial image so these characteristics are equivalent to those of light in the image projected into the resist, along with the rest of the limitations of claim 11.

As to claim 15, the prior art of record, taken alone or in combination, fails to disclose or render obvious an optical subsystem configured to alter one or more properties of light transmitted by a reticle and to project the light onto a detector configured to produce an aerial image of the reticle, along with the rest of the limitations of claim 15.

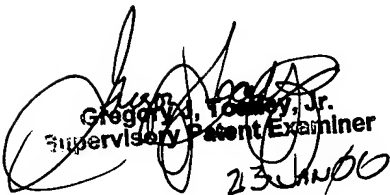
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marissa J. Detschel whose telephone number is 571-272-2716. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Marissa Detschel
January 10, 2006
MJD


Gregory J. Toatley, Jr.
Supervisory Patent Examiner
23 JAN 06